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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/709,336	04/29/2004	Do-Kyoung Kwon	MTKP0141USA	3335

27765 7590 06/30/2008

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EXAMINER	
VO, TUNG T	

ART UNIT	PAPER NUMBER
2621	

NOTIFICATION DATE	DELIVERY MODE
06/30/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/709,336	Applicant(s) KWON ET AL.	
	Examiner Tung Vo	Art Unit 2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _03_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _27 March 2008_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-42_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-6,21-28 and 30-42_ is/are rejected.

7)☒ Claim(s) _7-20 and 29-39_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _29 April 2004_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _02/22/08_.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-5, 21, and 23 are rejected under 35 U.S.C. 102(e) as being anticipated by Joch et al. (US 7,227,901).

Re claim 1, Joch discloses a method for reducing a blocking artifact in a video stream, the method comprising:

determining a filtering range (col. 6, lines 45-47, 124 and 126 of fig. 5, selecting 3-tap filters or 5-tap filters, col. 17, lines 64-67) according to block coding types of a plurality of adjacent blocks in the video stream, wherein the filtering range specifies a number of pixels to filter around a block boundary between the adjacent blocks; and

filtering (128-134 of fig. 5) a plurality of pixels around the block boundary according to the filtering range to reduce the blocking artifact in the video stream (col. 6, lines 47-58);

wherein according to the block coding types of the adjacent blocks in the video stream (fig. 3b; and 120-134 of fig. 5), the filtering range is determined to be up to eight pixels around the block boundary (p3, p2, p1, p0, q0, q1, q2, q3 of fig. 3a, eight pixels are around the block boundary).

Re claim 2, Joch further discloses determining a region mode (47 of fig. 3a, smooth area, col. 9, lines 40-45, 112 of fig. 5) according to local activity around the block boundary, wherein

the plurality of pixels around the block boundary are filtered also according to the region mode (col. 7, lines 34-45).

Re claim 3, Joch further discloses wherein according to the block coding types of the adjacent blocks in the video stream, the filtering range is determined to be up to eight pixels around the block boundary (47 of fig. 3a).

Re claim 4, Joch further discloses wherein determining the filtering range according to the block coding types of the adjacent blocks in the video stream further comprises: if at least one of the adjacent blocks is an intra-coded block, determining the filtering range to be up to four pixels around the block boundary (124 and 126 of fig. 5); and if none of the adjacent blocks are intra-coded blocks, determining the filtering range to be up to eight pixels around the block boundary (12, 124, and 126 of fig. 5).

Re claim 5, Joch further discloses wherein determining the region mode according to the local activity around the block boundary between the adjacent blocks in the video stream further comprises: calculating an activity value representing local activity around the block boundary; and determining the region mode according to the activity value (112, 114, 114, and 116 of fig. 5).

Re claim 21, Joch further disclose wherein filtering the pixels around the block boundary comprises first filtering the pixels at the block boundary and next filtering pixels not adjacent to the pixels at the block boundary (122, 124, 126, and 128-134 of fig. 5).

Re claim 23, Joch further discloses wherein the video stream is an MPEG video stream (col. 1, lines 19-29).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Joch et al. (US 7,227,901) in view of Ameres et al. (US 7,027,654).

Re claim 6, Joch teaches the content activity measure is derived from the absolute value of the separation between sample values of p0, p1, q0, q1 on either side of the boundary 47 (col. 13, lines 23-28) .

It is noted that Joch does not particularly teach wherein calculating the activity value comprises summing absolute differences between pixels V around the block boundary as follows:

$$\mathrm{ACTIVITY} = \sum_{i=4}^{4} |v_i - v_{i+1}| + \sum_{i=5}^{10} |v_i - v_{i+1}|$$

However, Ameres teaches calculating the activity value (col. 5, lines 1-10) comprises summing absolute differences between pixels V around the block boundary using the formulas (col. 5, lines 1-10) follows:

$$Side1SAD = \sum_{i=1}^{4} \mathrm{abs}(x_i - x_{i-1})$$

$$Side2SAD = \sum_{i=5}^{9} \mathrm{abs}(x_i - x_{i-1})$$

Taking the teachings of Joch and Ameres as a whole, it would have been obvious to one of ordinary skill in the art to incorporate the teachings of Ameres into the method of Joch in order to reduce the decoder complexity on vector processing machines that are capable of doing the same operation to multiple values stored sequentially in a machine's registers by lowering the complexity of the 2 dimensional transform and decoding time.

3. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Joch et al. (US 7,227,901) in view of Hsu et al. (US 2005/0013497).

Re claim 22, Joch further teaches if the video stream comprises video frame, performing an interpolation operation to estimate pixel values in frames before filtering the pixels around the block boundary (col. 11, lines 27-29).

Joch does not particularly teach if the video stream comprises interlaced video, performing an interpolation operation to estimate pixel values in an interlaced field before filtering the pixels around the block boundary as claimed.

However, Hsu teaches a video decoder decodes a motion vector for a current interlaced macroblock (e.g., a frame or field macroblock) and obtains a prediction macroblock for the current macroblock using the decoded motion vector [0043], this would obviously suggest if the video stream comprises interlaced video, performing an interpolation operation to estimate pixel values in an interlaced field.

Therefore, taking the teachings of Joch and Hsu as a whole, it would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu into the method of Joch in order

to provide rounding leads to lower implementation costs by favoring less complicated positions for interpolation (e.g., integer and half-integer locations).

4. Claims 24-27, and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joch et al. (US 7,227,901) in view of Hsu et al. (US 2005/0013497) and Kondo et al. (US 6,748.113), and further in view of Mathews et al. (US 6,459,731).

Re claim 24, Joch teaches a post processing de-blocking filter (44 of fig. 4; fig. 5) comprising: a threshold determination unit (112 of fig. 5) for adaptively determining a plurality of threshold values (112 of fig. 5) according to at least differences in quantization parameters QPs of a plurality of adjacent blocks in a received video stream and according to a user defined offset (UDO) (114 and 115 of fig. 5) allowing the threshold levels to be adjusted according to the UDO value; and

a de-blocking filtering unit (122, 124, 126-134 of fig. 5) for determining a filtering range specifying a maximum number of pixels to filter around a block boundary between the adjacent blocks, for determining a region mode (47 of fig. 3a, col. 14, lines 38-45) according to local activity around the block boundary, for selecting a plurality of at least three filters to filter pixels around the block boundary to reduce the blocking artifact (124 and 126 of fig. 5, choose 3-tap filters; col. 17, lines 60-67), and for filtering a plurality of pixels around the block boundary according to the filtering range, the region mode, and the selected filter (128 and 132 of fig. 5, filtering); wherein the de-blocking filtering unit (44 of fig. 4) further refines the filtered pixels according to the quantization parameters QPs of the adjacent blocks, or uses symmetric filters or asymmetric filters to filter the pixels according to the quantization parameters QPs of the

adjacent blocks (col. 14, lines 29-45; col. 15, lines 1-20); the de-blocking filtering unit first filters the pixels at the block boundary and next filters pixels not adjacent to the pixels at the block boundary (tables 2 and 3).

Joch further teaches if the video stream comprises video frame, performing an interpolation operation to estimate pixel values in frames before filtering the pixels around the block boundary (col. 11, lines 27-29), but Joch does not particularly teach if the video stream comprises interlaced video, performing an interpolation operation to estimate pixel values in an interlaced field before filtering the pixels around the block boundary as claimed.

However, Hsu teaches a video decoder decodes a motion vector for a current interlaced macroblock (e.g., a frame or field macroblock) and obtains a prediction macroblock for the current macroblock using the decoded motion vector [0043], this would obviously suggest if the video stream comprises interlaced video, performing an interpolation operation to estimate pixel values in an interlaced field.

Therefore, taking the teachings of Joch and Hsu as a whole, it would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu into the method of Joch in order to provide rounding leads to lower implementation costs by favoring less complicated positions for interpolation (e.g., integer and half-integer locations).

It is noted that the combination of Joch and Hsu does not particularly disclose selecting one of a plurality of filters to filter a plurality of pixels around the block boundary to reduce the blocking artifact according to the region mode as claimed.

However, Kondo teaches that the table 6 shows an exemplified case where the filter is selected from three types of filters F1, F2 and F3. In this case, the strength of the filter (the

capability of eliminating ringing artifact) is the lowest in the filter F1 and the highest in the filter F3 (col. 41, lines 1-17).

Taking the teachings of Joch, Hsu, and Kondo as a whole, it would have been obvious to one of ordinary skill in the art to modify the selection one of at least three filters of Kondo into the combined apparatus of Joch and Hsu to provide the processing operation and a memory capacity required for the noise elimination can be reduced.

It is further noted that the combination of Joch, Hsu, and Kondo does not particularly disclose at least one of the filters is a one dimensional filter formed by using a 4-point Hadamard Transform (HT) as claimed.

However, Mathews et al. discloses the filter arrangement (180 of fig. 1) using a one dimensional filter formed by using Hadamard Transform (HT) (col. 4, lines 32-42).

Therefore, taking the teachings of Joch, Hsu, Kondo, and Mathews as a whole, it would have been obvious one of ordinary skill in the art to use the Hadamard Transform in the filter of the combined apparatus of Joch, Hsu, and Kondo in order to produce 4-point Hadamard Transform to improve the quality of a recovered image in the system.

Re claims 25-27 and 40, Joch further teaches determining a region mode (47 of fig. 3a, smooth area, col. 9, lines 40-45, 112 of fig. 5) according to local activity around the block boundary, wherein the plurality of pixels around the block boundary are filtered also according to the region mode (col. 7, lines 34-45); wherein according to the block coding types of the adjacent blocks in the video stream, the filtering range is determined to be up to eight pixels around the block boundary (47 of fig. 3a); wherein determining the filtering range according to the block coding types of the adjacent blocks in the video stream further comprises: if at least

one of the adjacent blocks is an intra-coded block, determining the filtering range to be up to four pixels around the block boundary (124 and 126 of fig. 5); and if none of the adjacent blocks are intra-coded blocks, determining the filtering range to be up to eight pixels around the block boundary (12, 124, 126 of fig. 5); wherein determining the region mode according to the local activity around the block boundary between the adjacent blocks in the video stream further comprises: calculating an activity value representing local activity around the block boundary; and determining the region mode according to the activity value (112, 114, 114, and 116 of fig. 5); wherein filtering the pixels around the block boundary comprises first filtering the pixels at the block boundary and next filtering pixels not adjacent to the pixels at the block boundary (122, 124, 126, and 128-134 of fig. 5); wherein the video stream is an MPEG video stream (col. 1, lines 19-29).

Re claims 41 and 42, see analysis in claims 24-27 and 40.

5. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Joch et al. (US 7,227,901) Hsu et al. (US 2005/0013497), Kondo et al. (US 6,748.113), and further in view of Mathews et al. (US 6,459,731) as applied to claims 24 and 27, and further in view of Ameres et al. (US 7,027,654).

Re claim 28, Joch teaches the content activity measure is derived from the absolute value of the separation between sample values of p0, p1, q0, q1 on either side of the boundary 47 (col. 13, lines 23-28) .

It is noted that Joch does not particularly teach wherein calculating the activity value comprises summing absolute differences between pixels V around the block boundary as follows:

$$\mathrm{ACTIVITY} = \sum_{i=4}^{6} |v_i - v_{i-1}| + \sum_{i=8}^{12} |v_i - v_{i-1}|$$

However, Ameres teaches calculating the activity value (col. 5, lines 1-10) comprises summing absolute differences between pixels V around the block boundary using the formulas (col. 5, lines 1-10) follows:

$$Side1SAD = \sum_{i=1}^{4} \mathrm{abs}(x_i - x_{i-1})$$

$$Side2SAD = \sum_{i=5}^{9} \mathrm{abs}(x_i - x_{i-1})$$

Taking the teachings of Joch, Hsu, Kondo, Mathews, and Ameres as a whole, it would have been obvious to one of ordinary skill in the art to incorporate the teachings of Ameres into the combined apparatus of Joch, Hsu, Kondo, and Mathews in order to reduce the decoder complexity on vector processing machines that are capable of doing the same operation to multiple values stored sequentially in a machine's registers by lowering the complexity of the 2 dimensional transform and decoding time.

Response to Arguments

3. Applicant's arguments filed 03/27/2008 have been fully considered but they are not persuasive.

The applicant argues that Joch does not teach wherein according to the block coding types of the adjacent blocks in the video stream, the filtering range is determined to be up to eight pixels around the block boundary, pages 18-20 of the remarks.

The examiner respectfully disagrees with the applicant. It is submitted that Joch discloses wherein according to the block coding types of the adjacent blocks in the video stream (fig. 3b; and 120-134 of fig. 5), the filtering range is determined to be up to eight pixels around the block boundary (p3, p2, p1, p0, q0, q1, q2, q3 of fig. 3a, eight pixels are around the block boundary).

The applicant argues that Joch does not disclose if at least one of the adjacent blocks is an intra-coded block, determining the filtering range to be up to four pixels around the block boundary, page 21 of the remarks.

The examiner respectfully disagrees with the applicant. It is submitted that Joch teaches at least one of the adjacent blocks is an intra-coded block (124-134 of fig. 5), determining the filtering range to be up to four pixels around the block boundary (130 or 134 of fig. 5, Note P0 refers to Fig. 3a, of which there are only 4 pixels labeled P0 and when the 5-tap filter is applied in either steps 130 or 134, the filtering range includes P0, P 1, and P2 (in the case of luminance filtering), which includes up to 12 pixels). The range is up to 12 pixels would obviously encompass 4 pixels around the block boundary.

Allowable Subject Matter

6. Claims 7-20, and 29-39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Neither Joch, Hsu, Kondo, Mathews nor Ameres teaches if at least one of the adjacent blocks is an intra-coded block: if the activity value is greater than a first threshold, determining the region mode to be an active region; if the activity value is less than the first threshold but greater than a second threshold, determining the region mode to be a smooth region; and if the activity value is less than the second threshold, determining the region mode to be a dormant region; and if none of the adjacent blocks are intra-coded blocks: if the activity value is greater than a third threshold, determining the region mode to be an active region; if the activity value is less than the third threshold but greater than the second threshold, determining the region mode to be a smooth region; and if the activity value is less than the second threshold, determining the region mode to be a dormant region as specified in claim 7; if at least one of the adjacent blocks is an intra-coded block: if the activity value is greater than a first threshold, the de-blocking filtering unit determines the region mode to be an active region; if the activity value is less than the first threshold but greater than a second threshold, the de-blocking filtering unit determines the region mode to be a smooth region; and if the activity value is less than the second threshold, the de-blocking filtering unit determines the region mode to be a dormant region; and if none of the adjacent blocks are intra-coded blocks: if the activity value is greater than a third threshold, the de-blocking filtering unit determines the region mode to be an active region; if the activity value is less than the third threshold but greater than the second threshold, the de-blocking

filtering unit determines the region mode to be a smooth region; and if the activity value is less than the second threshold, the de-blocking filtering unit determines the region mode to be a dormant region as specified in claim 29.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tung Vo whose telephone number is 571-272-7340. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on 571-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tung Vo/

Primary Examiner, Art Unit 2621